Our Docket No: 004906.P003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	
Suhail Nanji	)	Examiner: Phirin Sam
	)	
Application No: 09/699,198	)	Art Unit: 2661
	)	
Filed: October 27, 2000	)	Confirmation No.: 6605
	)	
For: TUNNELING ETHERNET	)	
	)	

DECLARATION OF SUHAIL NANJI
Pursuant to 37 C.F.R. § 1.132

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

I, Suhail Nanji hereby declare that:

1. Redback Networks Incorporated is the assignee of the above-identified patent application.
2. I have reviewed the above-identified patent application, including the claims. I am the inventor of the invention claimed in the above-identified patent application.
3. As a Redback Networks Incorporated employee, I was assigned the responsibility of developing Ethernet over Layer 2 Tunneling Protocol techniques for the Redback Networks Access Operating System, Release 3.1, an operating system manufactured by Redback Networks Incorporated.
4. The invention claimed in the above-identified patent application was embodied in the Redback Networks Access Operating System, Release 3.1.
5. I have reviewed the Redback Networks publications cited by the Patent Examiner in the application. The Redback Networks publications are entitled "Access Operating System Configuration Guide 3.1", dated 1999; "Access Operating System Command Reference Guide 3.1", dated 2000; and "Release Note for Redback AOS, Release 3.1.4", dated April 2000." A copy of the Redback Networks publications are attached hereto as Exhibits A, B,

and C, respectively. These publications are manuals for the Redback Networks Access Operating System, Release 3.1.

6. The subject matter related to my invention disclosed in the Redback Networks publications is attributable to me and was published on my behalf.

I, Suhail Nanji, hereby declare that all statements herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made knowing that willful false statements and the like are punishable by fine or imprisonment, or both under § 1001 of Title 18 of United States Code, and such willful or false statements may jeopardize the validity of the above-identified application or any patent issuing therefrom.

Respectfully submitted,

Date: 5/4/2005 Suhail Nanji

Suhail Nanji

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(37 C.F.R. § 1.8(a))

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on 5/5/05
Date of Deposit

Cheri Clinkenbeard
Name of Person Mailing Correspondence

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Signature Date

Ex. A

Access Operating System (AOS) Configuration Guide

Release 3.1
Part Number 220-0122-01

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- Increase the separation between equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

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2. CABLES

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3. OPERATING CONDITIONS

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The power cord set used with the System must meet the requirements of the country, whether it is 100-120 or 220-264 VAC.

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The SMS 1000 and SMS 500 are Year 2000 (Y2K) Compliant. This means that the SMS 1000 and SMS 500 accurately process date/time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 including the year 2000 leap-year calculations. Furthermore, when used in combination with other information technology, the SMS 1000 and SMS 500 accurately process date/time data to the extent other information technology properly exchanges date/time data with it.

Table of Contents

Once the default settings have been changed, the new values will be applied to any new peer that is created unless the values are changed in the configuration for an individual peer.

Configuring Ethernet over L2TP

This section describes how to configure L2TP tunnels to carry Ethernet-encapsulated PPPoE sessions. Before configuring your system for Ethernet over L2TP, be sure to read the preceding section called "Configuring L2TP."

By allowing Ethernet sessions over L2TP tunnels, AOS is able to provide the LNS full control over the advertisement of services. The following sections are included:

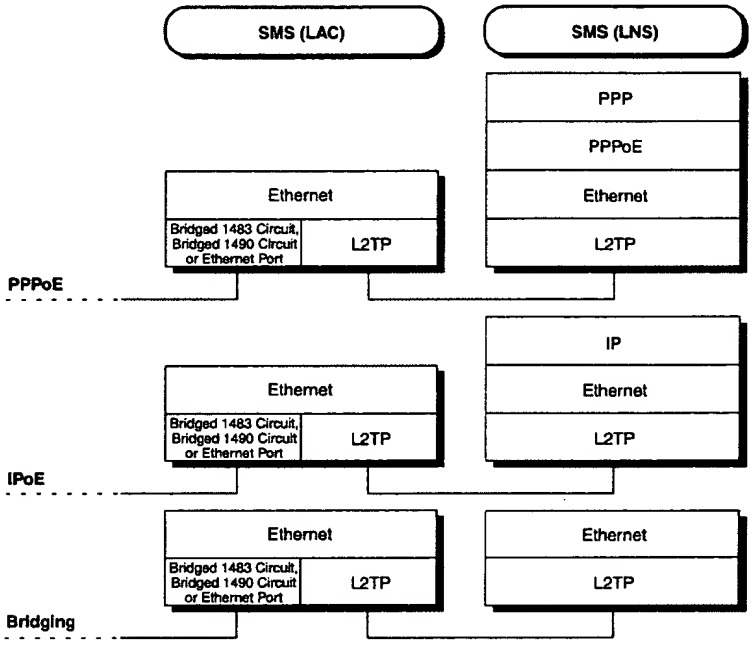
- "Overview"
- "Configuration Tasks on the LAC Side"
- "Configuration Tasks on the LNS Side"
- "Configuration Examples"

For a complete description of the commands related to Ethernet over L2TP, see the *Access Operating System (AOS) Command Reference.*

Overview

The AOS implementation of Ethernet over L2TP allows Ethernet sessions to be tunneled intact to the LNS. Since Ethernet connectivity is required for advertisement of services, this is a significant advantage for the LNS. Figure 5-15 shows the relationship of protocols/encapsulations between a LAC and an LNS in the three types of sessions that might be tunneled in this fashion: PPP over Ethernet (PPPoE), IP over Ethernet, and Bridging.

Figure 5-15 Protocol Stack When Tunneling Ethernet over L2TP



It is important to note that if more than one Ethernet session is tunneled from one peer and bound to the same interface on the LNS, AOS can not use ARP to resolve the IP address to a physical/MAC address. As an alternative, you can use DHCP with secured ARP as a way to map IP addresses to physical MAC addresses.

Configuration Tasks on the LAC Side

To configure Ethernet over L2TP on the LAC side, you must first set up the L2TP peers according to the instructions in the previous section, "Configuring L2TP." Then, perform the tasks in the following sections:

- "Identify the Ethernet Ports or Bridge-Encapsulated Circuits"
- "Bind the Ports or Bride-Encapsulated Circuits to the Peers"
- "Enable Ethernet Sessions Retry over L2TP"

Identify the Ethernet Ports or Bridge-Encapsulated Circuits

The first step is to decide which Ethernet ports or bridge-encapsulated circuits you want tunneled over L2TP. This is necessary because you will be "hard" binding them to L2TP peers.

Bind the Ports or Bride-Encapsulated Circuits to the Peers

To bind a port or circuit to an L2TP peer, enter the following command in port, circuit, or HDLC channel configuration mode as appropriate:

bind session *peer-name context*

where *peer-name* is the name of the L2TP peer to which the circuit or port is to be bound and *context* is the context in which that peer exists. If you are binding an Ethernet port, the bind session command puts the port into "promiscuous mode" which means that it will ignore MAC addresses and tunnel everything to the LNS. The concept of promiscuous mode is implicit for Bridged 1483 and Bridged 1490 encapsulated circuits.

Enable Ethernet Sessions Retry over L2TP

To enable the creation of Ethernet sessions over L2TP, enter the following command in context configuration mode:

aaa authentication re-try *minutes*

where *minutes* is the number of minutes the system is to wait before re-attempting to connect after failure to establish a session to the tunnel peer. By default, no further attempts are made once an attempt to create a session has failed. No attempt is made to create a connection until data begins to come through over the circuit/port.

Configuration Tasks on the LNS Side

To configure Ethernet over L2TP from the LNS side, you must first set up the L2TP peers as described in the previous section, "Configuring L2TP." Then, perform the tasks in the following sections:

- "Determine How Subscribers Will Be Terminated"
- "Bind the Sessions"

Determine How Subscribers Will Be Terminated

Subscribers can be terminated in one of two ways: IP over Ethernet or PPPoE. These two encapsulations are mutually exclusive and apply to all Ethernet-encapsulated sessions from the peer. This decision is made on the LNS side because the LAC is intended to send everything, without evaluation.

If the client is using PPPoE, configure the peer as such by entering the following command in L2TP configuration mode:

ethernet encapsulation ppp over-ethernet

If the client is using IP over Ethernet, the default setting for this command (**ppp**) is what you want.

Bind the Sessions

To bind a session to a PPPoE client, enter the following command in L2TP configuration mode:

ethernet session auth {**pap** | **chap** | **chap pap**} [**maximum** *sessions*] [**context** *name* | **service-group** *name*]}

where **pap**, chap, and **chap pap** are authentication method choices, the **maximum** *sessions* construct allows you to limit the number of PPPoE sessions allowed per L2TP session, the **context** *name* construct allows you to restrict the Ethernet-encapsulated PPPoE sessions to the named context, and the

service-group *name* construct allows you to limit the services available to those permitted by the named service access list. If the peer is not first encapsulated as PPPoE (with the **ethernet encapsulation ppp over-ethernet** command), the **auth** construct is not available on the command line.

To bind a session to an IP over Ethernet client, enter the following command in L2TP configuration mode:

ethernet session interface *interface context*

where *interface* is the name of the interface to which the Ethernet session is to be bound and *context* is the name of the context in which the interface exists.

Configuration Examples

The following example shows configuring an L2TP peer to terminate subscribers as PPPoE and bind the Ethernet sessions to the peer with CHAP PAP:

```
[local]RedBack(config-ctx)#l2tp-peer name lnsmain media pvc
[local]RedBack(config-l2tp)#ethernet encapsulation ppp over-ethernet
[local]RedBack(config-l2tp)#ethernet session auth pap
```

Configuring L2F

This section describes AOS' ability to interoperate with legacy systems that are implementing Cisco's Layer 2 Forwarding (L2F) protocol. L2F supports the creation of secure virtual private dial-up networks over the Internet and is one of the predecessors to L2TP.

The following sections are included:

- "Overview"
- "Configuration Tasks"
- "Configuration Examples"

For a complete description of the commands related to L2F, see the *Access Operating System (AOS) Command Reference*.

Overview

The AOS implementation of L2F supports the following:

- Both Network Access Server (NAS) and home gateway functions. Consistent with the limitations of the L2F protocol, a peer may function as one or the other, but not both.
- Tunnel switching between L2F tunnels and between L2F and L2TP tunnels.
- UDP/IP tunnel encapsulation.
- A tunnel may be defined in one context, while the sessions within that tunnel may be terminated or may be further tunneled (tunnel switch) in any contexts.
- L2F tunnel configurations can be configured locally (in the AOS configuration file) or they can be served by RADIUS.

Ex. B

Access Operating System (AOS) Command Reference

Release Number or Date
Part Number 220-0123-01

Redback NETWORKS

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FCC Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Increase the separation between equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

1. MODIFICATIONS

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Redback could void the user's authority to operate the equipment.

2. CABLES

Connection to this device must be made with shielded cables with metallic RFI/EMI connector hoods to maintain compliance with FCC Rules and Regulations.

3. OPERATING CONDITIONS

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

4. POWER CORD SET REQUIREMENTS

The power cord set used with the System must meet the requirements of the country, whether it is 100-120 or 220-264 VAC.

U.S. and Canada. The cord set must be UL Listed and CSA Certified.

5. SAFETY NOTICES

a. Laser Equipment:

CAUTION! USE OF CONTROLS OR ADJUSTMENTS OF PERFORMANCE OR PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

b. Lithium Battery:

It is recommended that, when required, Redback replace the lithium battery.

CAUTION! DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE IS RECOMMENDED BY THE MANUFACTURER'S INSTRUCTIONS.

Year 2000 (Y2K) Compliance

The SMS 1000 and SMS 500 are Year 2000 (Y2K) Compliant. This means that the SMS 1000 and SMS 500 accurately process date/time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries, and the years 1999 and 2000 including the year 2000 leap-year calculations. Furthermore, when used in combination with other information technology, the SMS 1000 and SMS 500 accurately process date/time data to the extent other information technology properly exchanges date/time data with it.

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ethernet encapsulation

ethernet encapsulation ppp over-ethernet

default ethernet encapsulation

Purpose

Specifies the type of Ethernet encapsulation to be used for any Ethernet on the L2TP peer.

Syntax Description

ppp over-ethernet	Specifies that the type of Ethernet encapsulation to be used is PPP over Ethernet (PPPoE).

Default

IP/bridging encapsulation is selected for Ethernet over L2TP sessions if this command is not used.

Usage Guidelines

At this time, PPPoE is the only encapsulation option available using this command. If this command is not issued, the encapsulation for the peer is set to IP/bridging for Ethernet over L2TP sessions.

Use this command when you want to be able to have Ethernet encapsulated sessions through L2TP tunnels.

The **default** form of this command resets the encapsulation to IP/bridging.

Examples

The following example sets the Ethernet encapsulation on an L2TP peer to PPPoE:

```
[local]RedBack(config-ctx)#l2tp-peer name peer1
[local]RedBack(config-l2tp)#ethernet encapsulation ppp over-ethernet
```

Related Commands

l2tp-peer name
l2tp-peer unnamed
show l2tp info

ethernet session

ethernet session {{**auth** {**pap** | **chap** | **chap pap**} [**maximum** *sessions*] [**context** *name* | **service-group** *name*]} | **interface** *interface context*}

no ethernet session

Purpose

Specifies the authentication method to be used for the Ethernet session on the L2TP peer.

Syntax Description

auth pap	Specifies that Password Authentication Protocol (PAP) be used to obtain the username and password from the subscriber.
auth chap	Specifies that Challenge Handshake Authentication Protocol (CHAP) be used to obtain the username and password from the subscriber.
auth chap pap	Specifies that either PAP or CHAP can be used to obtain the username and password from the subscriber, but that CHAP is preferred.
maximum *sessions*	Optional when **auth** is specified. Maximum number of PPPoE sessions allowed per L2TP session. Valid range is 0 (which means there is no maximum) through 8000. The default value is 0.
context *name*	Optional when **auth** is specified. Restricts PPPoE sessions with Ethernet encapsulation on the circuits and ports being bound to the specified context.
service-group *name*	Optional when **auth** is specified. Limits the services available to the circuit or port to those permitted by the named service access list.
interface *interface context*	The name of the interface to which the Ethernet session is to be bound and the name of the context within which the interface exists.

Default

None

Usage Guidelines

The **auth** and **interface** constructs are mutually exclusive. The **auth** construct is only available when the session is PPPoE with Ethernet encapsulation. Otherwise, the **interface** construct is available. The authentication controlled by the **auth** construct is only for the Ethernet-encapsulated PPPoE session carried by the tunnel, not any PPP sessions that might also be present. For the PPP sessions, the **session auth** command controls the authentication method.

The **no** form of this command removes the setting.

Examples

The following example shows setting the authentication method for an Ethernet-encapsulated PPPoE session:

```
[local]RedBack(config-ctx)#l2tp-peer name peer1
[local]RedBack(config-l2tp)#ethernet session auth chap pap
```

Related Commands

l2tp-peer name
l2tp-peer unnamed
show l2tp info

Ex. C

Release Notes for Redback AOS Release 3.1.4

April 2000
Part Number 220-0121-03

Redback NETWORKS

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Contents

L2F

AOS Release 3.1 includes support for Cisco's Layer 2 Forwarding (L2F) protocol. You can configure the SMS to operate as a Network Access Server (NAS) or Home Gateway (HG) for UDP/IP-based tunnels.

L2TP

AOS Release 3.1 includes the following L2TP enhancements:

- Fixed service selection—You can configure an LNS to hardwire PPP sessions that arrive from an L2TP peer to a specific context. This feature enables you to disable dynamic service selection for the PPP sessions that arrive from an L2TP peer.
- Ethernet over tunnels—You can now tunnel Ethernet (including bridged 1483 and bridged 1490 circuits) over an L2TP tunnel. A tunnel can support both Ethernet and PPPoE traffic concurrently.
- Per-session ID string over tunnels—When running as an LNS, AOS now adds the originating LAC's local name as the session ID string.
- Additional L2TP counters—The **show l2tp counters** and **show l2tp info** operator exec commands now include established sessions, total established sessions, and total failed sessions counters in the command output.
- L2TP AVPs—AOS Release 3.1 includes several new vendor-specific L2TP attribute-value pairs (AVPs). See Appendix F, "L2TP Attribute Value Pairs," in the *Access Operating System (AOS) Configuration Guide*.

ATM

- ATM IMA—AOS Release 3.1 supports the ATM Forum Inverse Multiplexing for ATM (IMA) Version 1.0 (AF-PHY-0086.000) and Version 1.1 (AF-PHY-0086.001) specifications. Using the IMA feature, you can configure multiple ports on an ATM T1 I/O module to operate as a single link.
- Increased VCI range—The range of VCIs for ATM Version 2 I/O modules is 1 through 65535 for ATM Version 2 I/O modules.
- GFR traffic shaping—Use the new **gfr** option for the **shaping** ATM profile configuration command to specify shaping based on Guaranteed Frame Rate. GFR is supported on ATM Version 2 I/O modules only.
- Shaped virtual paths—Use the new **atm vp** port configuration command to create a shaped virtual path. Virtual paths are supported on ATM Version 2 I/O modules only.

Service Access Lists

You can define service access lists to restrict the available services (such as contexts and tunnels) available to subscribers on a per-circuit basis.

AAA

AOS Release 3.1 supports the following new AAA features and enhancements: